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the condition of education 2004

INDICATOR 21

Trends in Science and Mathematics Coursetaking

The indicator and corresponding tables are taken directly from *The Condition of Education 2004*. Therefore, the page numbers may not be sequential.

Additional information about the survey data and supplementary notes can be found in the full report. For a copy of *The Condition of Education 2004* visit the NCES web site (http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2004077) or contact ED PUBs at 1-877-4ED-PUBS.

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U.S. Department of Education
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Coursetaking and Standards

Trends in Science and Mathematics Coursetaking

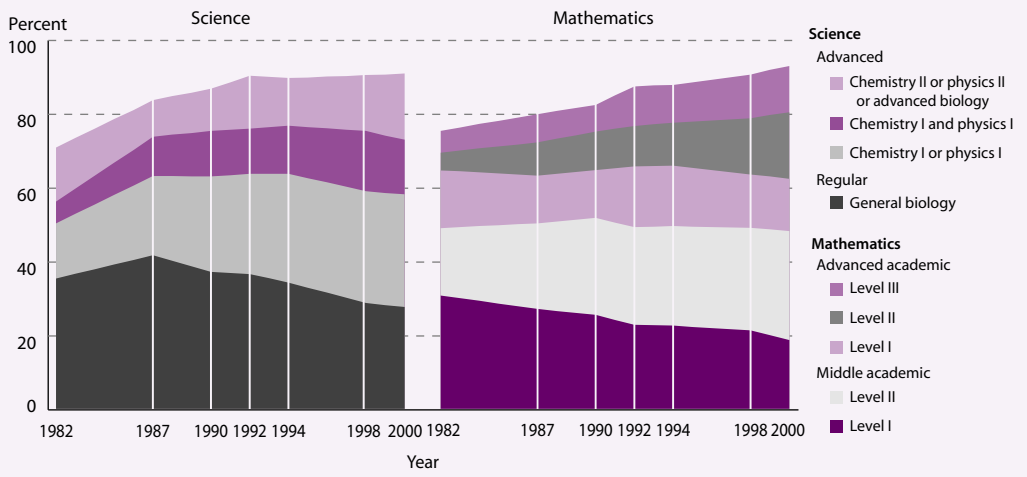
The percentage of high school graduates who had completed advanced courses in science and mathematics increased between 1982 and 2000.

Student achievement is related to the academic level of coursework that students complete, controlling for various school and background factors (Chaney, Burgdorf, and Atash 1997; Berends, Lucas, and Briggs forthcoming). This indicator shows the trends between 1982 and 2000 in the highest level of science and mathematics coursework that high school graduates completed. This indicator can be viewed only as a proxy measure of change in student coursework because the content and instructional methods of high school courses with similar descriptions can vary across classes and schools, as well as over time.

Since the early 1980s, when states began to increase the number of required courses to receive a high school diploma (NCES 95–029, table 151), the percentage of high school graduates completing advanced coursework in science and mathematics has increased. In 1982, 35 percent of high school graduates had completed advanced science coursework (i.e., at least one course classified as more challenging than general biology); this percentage had increased to 63 percent by 2000 (see supplemental table 21-1). Most of this increase is attributable to increases in the rates at which graduates completed chemistry I and/or physics I because the percentage who had completed at least one course of either chemistry II, physics II, or advanced biology increased only from 15 to 18 percent between 1982 and 2000.

The percentage of high school graduates who had completed courses in advanced academic mathematics (i.e., completed at least one course classified as more challenging than algebra II and geometry I) increased from 26 percent in 1982 to 45 percent in 2000 (see supplemental table 21-2). Moreover, the percentage who had completed advanced level II (i.e., precalculus or an introduction to analysis) more than tripled (from 5 to 18 percent). The percentage who had completed advanced level III (i.e., a course in calculus) doubled (from 6 to 13 percent).

COURSETAKING LEVELS: Percentage of high school graduates who completed regular and advanced levels of science and middle and advanced levels of mathematics, by highest level of coursetaking completed: Selected years 1982–2000



NOTE: Not displayed are the percentages of graduates who completed no or low academic science and mathematics courses. See *supplemental note 6* for details on the science and mathematics coursetaking levels. See *supplemental note 3* for more information on the High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80) and the National Education Longitudinal Study of 1988 (NELS:88). See *supplemental note 4* for more information on the National Assessment of Educational Progress (NAEP).

SOURCE: U.S. Department of Education, NCES, High School and Beyond Longitudinal Study of 1980 Sophomores, "First Follow-up" (HS&B-So: 80/82); National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, High School Transcript Survey, 1992"; and National Assessment of Educational Progress (NAEP), selected years, 1987–2000 High School Transcript Studies (HSTS).

FOR MORE INFORMATION:

Supplemental Notes 3, 4, 6

Supplemental Tables 21-1, 21-2

NCES 95–029, 2004–455

Berends, Lucas, and Briggs forthcoming

Chaney, Burgdorf, and Atash 1997

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Table 21-1. Percentage distribution of high school graduates by highest level of science courses completed: Selected years 1982–2000

		Low academic level				Advanced academic level			
Year	No science[1]	Total	Primary physical science	Secondary physical science and basic biology	General biology	Total	Chemistry I or physics I	Chemistry I and physics I	Chemistry II or physics II or advanced biology
1982	2.2	27.2	12.2	15.0	35.2	35.4	14.9	5.9	14.6
1987	0.8	15.8	6.7	9.1	41.5	41.9	21.4	10.6	9.9
1990	0.7!	12.8	4.2	8.7	37.0	49.5	25.8	12.3	11.4
1992	0.3!	9.7	2.8	6.9	36.4	53.5	27.1	12.2	14.3
1994	0.6	10.0	1.9	8.2	34.1	55.3	29.4	13.0	12.9
1998	0.6	9.3	3.0	6.3	28.6	61.5	30.2	16.3	15.1
2000	0.7	8.7	2.8	5.9	27.5	63.1	30.5	14.8	17.9

!Interpret data with caution (estimates are unstable).

[1]Indicates that student transcript records did not list any recognized science courses; however, these students may have studied some science.

NOTE: The distribution of graduates among the various levels of science courses was determined by the level of the most academically advanced course they had completed. Graduates may have completed advanced levels of courses without having taken courses at lower levels. See *supplemental note 6* for more details on these levels. See *supplemental note 3* for more information on the National Education Longitudinal Study of 1988 and the High School and Beyond Longitudinal Study of 1980 Sophomores. See *supplemental note 4* for more information on the National Assessment of Educational Progress (NAEP). Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, NCES, High School and Beyond Longitudinal Study of 1980 Sophomores, "First Follow-up" (HS&B-So:80/82); National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, High School Transcript Survey, 1992"; and National Assessment of Educational Progress (NAEP), selected years 1987–2000 High School Transcript Studies (HSTS).

Table 21-2. Percentage distribution of high school graduates by highest level of mathematics courses completed: Selected years 1982–2000

				Middle academic			Advanced academic			
Year	No mathematics[1]	Non-academic	Low academic	Total	Level I	Level II	Total	Level I	Level II	Level III
1982	0.8	16.7	7.4	48.8	30.6	18.2	26.3	15.6	4.8	5.9
1987	0.9	12.0	7.6	50.1	27.0	23.1	29.5	12.9	9.0	7.6
1990	0.6	9.0	8.2	51.6	25.4	26.2	30.6	12.9	10.4	7.2
1992	0.4!	6.2	6.3	49.0	22.7	26.4	38.1	16.4	10.9	10.7
1994	0.7	5.7	6.2	49.4	22.5	26.9	38.1	16.3	11.6	10.2
1998	0.8	3.6	5.3	48.9	21.2	27.7	41.4	14.4	15.2	11.8
2000	0.8	2.5	4.1	48.0	18.6	29.4	44.6	14.1	18.0	12.5

!Interpret data with caution (estimate is unstable).

[1]Indicates that student transcript records did not list any recognized mathematics courses; however, these students may have studied some mathematics.

NOTE: The distribution of graduates among the various levels of mathematics courses was determined by the level of the most academically advanced course they had completed. Graduates may have completed advanced levels of courses without having taken courses at lower levels. See *supplemental note 6* for more details on these levels. See *supplemental note 3* for more information on the National Education Longitudinal Study of 1988 and the High School and Beyond Longitudinal Study of 1980 Sophomores. See *supplemental note 4* for more information on the National Assessment of Educational Progress (NAEP). Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, NCES, High School and Beyond Longitudinal Study of 1980 Sophomores, "First Follow-up" (HS&B-So:80/82); National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, High School Transcript Survey, 1992"; and National Assessment of Educational Progress (NAEP), selected years 1987–2000 High School Transcript Studies (HSTS).

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Table S21. Standard errors for the percentage of high school graduates who completed regular and advanced levels of science and middle and advanced levels of mathematics, by highest level of coursetaking completed: Selected years 1982–2000

Level of course	1982	1987	1990	1992	1994	1998	2000
				Science			
Regular							
General biology	1.03	1.38	1.39	1.02	1.13	1.12	1.46
Advanced							
Chemistry I or physics I	0.55	1.01	0.87	0.97	0.95	1.26	1.05
Chemistry I and physics I	0.42	0.80	0.63	0.59	0.67	1.08	1.11
Chemistry II or physics II or advanced biology	0.74	0.88	0.95	0.80	0.80	1.25	1.43
				Mathematics			
Middle academic							
Level I	0.78	0.88	0.71	0.78	0.79	1.00	0.83
Level II	0.65	0.94	0.82	0.95	0.84	1.12	1.01
Advanced academic							
Level I	0.65	1.16	0.90	0.77	1.02	1.16	0.96
Level II	0.38	0.52	0.71	0.59	0.69	1.09	0.99
Level III	0.47	0.63	0.54	0.76	0.61	0.89	0.74

SOURCE: U.S. Department of Education, NCES, High School and Beyond Longitudinal Study of 1980 Sophomores, "First Follow-up" (HS&B-So:80/82); National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, High School Transcript Survey, 1992"; and National Assessment of Educational Progress (NAEP), selected years 1987–2000 High School Transcript Studies (HSTS).

Trends in Science and Mathematics Coursetaking

Table S21-1. Standard errors for the percentage distribution of high school graduates by highest level of science courses completed: Selected years 1982–2000

		Low academic level				Advanced academic level			
Year	No science	Total	Primary physical science	Secondary physical science and basic biology	General biology	Total	Chemistry I or physics I	Chemistry I and physics I	Chemistry II or physics II or advanced biology
1982	0.30	1.01	0.67	0.83	1.03	0.89	0.55	0.42	0.74
1987	0.12	1.18	0.64	0.93	1.38	1.17	1.01	0.80	0.88
1990	0.14	1.07	0.72	0.86	1.39	1.18	0.87	0.63	0.95
1992	0.10	0.64	0.27	0.59	1.02	1.08	0.97	0.59	0.80
1994	0.10	0.86	0.24	0.82	1.13	1.16	0.95	0.67	0.80
1998	0.11	0.84	0.54	0.67	1.12	1.51	1.26	1.08	1.25
2000	0.11	0.93	0.48	0.79	1.46	1.54	1.05	1.11	1.43

SOURCE: U.S. Department of Education, NCES, High School and Beyond Longitudinal Study of 1980 Sophomores, "First Follow-up" (HS&B-So:80/82); National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, High School Transcript Survey, 1992"; and National Assessment of Educational Progress (NAEP), selected years 1987–2000 High School Transcript Studies (HSTS).

Table S21-2. Standard errors for the percentage distribution of high school graduates by highest level of mathematics courses completed: Selected years 1982–2000

				Middle academic			Advanced academic			
Year	No mathematics	Non-academic	Low academic	Total	Level I	Level II	Total	Level I	Level II	Level III
1982	0.14	0.68	0.46	0.87	0.78	0.65	0.86	0.65	0.38	0.47
1987	0.13	0.71	0.69	1.23	0.88	0.94	1.26	1.16	0.52	0.63
1990	0.10	0.65	0.68	0.93	0.71	0.82	1.07	0.90	0.71	0.54
1992	0.10	0.38	0.49	1.00	0.78	0.95	1.06	0.77	0.59	0.76
1994	0.12	0.47	0.50	1.18	0.79	0.84	1.16	1.02	0.69	0.61
1998	0.13	0.35	0.40	1.29	1.00	1.12	1.37	1.16	1.09	0.89
2000	0.11	0.30	0.43	1.17	0.83	1.01	1.31	0.96	0.99	0.74

SOURCE: U.S. Department of Education, NCES, High School and Beyond Longitudinal Study of 1980 Sophomores, "First Follow-up" (HS&B-So:80/82); National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, High School Transcript Survey, 1992"; and National Assessment of Educational Progress (NAEP), selected years 1987–2000 High School Transcript Studies (HSTS).